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March 15, 1958

VOL. 73 NO. 11 PAGES 161-176

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

Top Talent Winners

See Page 166

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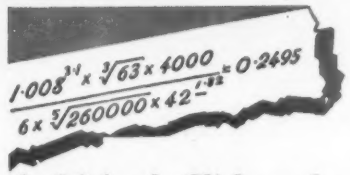

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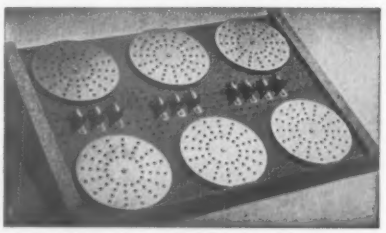

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PUBLIC HEALTH

Bomb Tests Peril World

Scientists admit that no one knows what the "tolerable limit" for hydrogen and atomic weapons testing is. However, there are both immediate and long-range or genetic hazards.

➤ THE SETTING OFF of three H-bombs by the Russians in five days has brought the world closer to the brink of radioactive peril.

Just how much closer is anybody's guess, however.

This is the opinion of leading radiation experts interviewed by SCIENCE SERVICE.

A majority of the biologists and geneticists queried held fast to their belief that any amount of radioactivity dumped into the atmosphere from any source is potentially dangerous.

Others, on the other hand, feel that there is a tolerable limit for hydrogen and atomic weapons testing which, if not exceeded, will not overburden the atmosphere with lethal radioactive debris.

What is considered a tolerable limit, however, is an elusive figure.

When it is mentioned, it is put in megaton terms, a megaton equaling the explosive force of 1,000,000 tons of T.N.T. Each of the recent Russian H-bomb detonations, according to the Atomic Energy Commission, was of megaton range.

The figure most often heard is that the world can stand a continuous rate of 10 megatons of fission per year. Scientists admit, however, that this is an arbitrary figure and no one knows what the limits really are.

Last August a committee of 12 of the Nation's leading scientists said:

"Pending a resolution of the differences and uncertainties it would appear that the consequences of further testing over the next several generations at the level of the past five years could constitute a hazard to the world's population. If the level of future testing rises, then the hazard could be greater and arrive sooner."

More recently, Drs. J. Laurence Kulp and Arthur R. Schulert of Columbia University's Lamont Geological Observatory and Dr. Walter R. Eckelmann, now at the Carter Research Laboratories, Tulsa, Okla., warned that the amount of cancer-causing strontium-90, an H-Bomb afterbirth product, in the bones of children will reach four times its present level even if there are no atomic tests in the future. (See SNL, Feb. 22, p. 117.)

If bomb tests continue at the recent rate, they found, the level of strontium-90 in the bones of persons living in northeastern United States will reach 200 times the present level by the year 2100.

This would be twice that now thought to be the maximum permissible.

(For the general population the National Bureau of Standards has declared a maximum permissible concentration of strontium-90 to be one-tenth microcurie, or 100 strontium units a kilogram of body calcium.)

Calculating the amount of fallout that has been unleashed since atomic and hydrogen weapons have been detonated is a difficult task and involves many variables. But it has been shown, for example, that approximately one-third of the total global burden of fission products, both in the stratosphere and on the ground, was produced by a single explosion in the Castle series of American tests in 1954.

By the same token, it has been estimated by Dr. H. Bentley Glass of Johns Hopkins University, Baltimore, Md., that nuclear tests are spreading about 10,000,000 tons of radioactive material over the earth every year. Dr. Curtice L. Newcombe of the Navy Radiological Defense Laboratory, San Francisco, Calif., has estimated that about 50,000,000 tons have been released in United States tests to date.

How many millions more tons have been spewed aloft by the recent Russian tests are either not known or classified information.

It should be pointed out that Dr. Newcombe warned last fall that 70,000,000 tons is the theoretical safe limit.

The problems are involved, the scientists admit, but the consequences are clear and they take two directions:

1. The immediate hazards from radioactivity to those now living.

2. The long-term genetic hazards to millions still unborn.

Science News Letter, March 15, 1958

PROBING SATELLITE NOSE CONE—A technician uses an ultrasonic probe on the stainless steel nose cone of an Explorer satellite. This vibrator is used for final testing of the cone's wall thickness, indicated on the graph by streaks of light on the instrument panel in the back.

TECHNOLOGY

Second Breeder Reactor Being Built by AEC

➤ THIS COUNTRY'S second breeder reactor, a nuclear power plant that produces more fissionable material than is burned, is being built by Argonne National Laboratory for the Atomic Energy Commission.

To design and construct the facility at the AEC's National Reactor Testing Station, $29,100,000 has been authorized. The reactor will be known as Experimental Breeder Reactor No. 2, or EBR-2.

Heat power rating of the reactor is 62,500 kilowatts and its net electrical output is set at 17,500 kilowatts. The breeder reactor offers the possibility of using economically and efficiently all natural uranium rather than only the fissionable uranium-235.

The EBR-2 reactor is scheduled for operation in 1960. EBR-1, which started operating in 1951, demonstrated the feasibility of breeding nuclear fuel in a reactor.

Science News Letter, March 15, 1958

GENERAL SCIENCE

Westinghouse Winners

$7,500 SCHOLARSHIP

Beeuwkes, Reinier III.	Newton High School	Newtonville, Mass.

$6,000 SCHOLARSHIP AND ALTERNATE TO $7,500 SCHOLARSHIP

Mitrovich, Dushan	Newton High School	Newtonville, Mass.

$5,000 SCHOLARSHIP AND ALTERNATE TO $6,000 SCHOLARSHIP

Shelby, Jane	Teaneck High School	Teaneck, N. J.

$4,000 SCHOLARSHIP AND ALTERNATE TO $5,000 SCHOLARSHIP

Jerina, Donald Michael	Leyden Community High School	Franklin Park, Ill.

$3,000 SCHOLARSHIP AND ALTERNATE TO $4,000 SCHOLARSHIP

Nininger, Neil Logan	Tamalpais High School	Mill Valley, Calif.

ALTERNATE TO $3,000 SCHOLARSHIP

Shepard, Kenneth Wayne	Sidney Lanier High School	Montgomery, Ala.

$250 SCIENCE AWARDS

Erlich, Elvera Rena	Overbrook High School	Philadelphia, Pa.
Herschkopf, Sybil	Ramaz High School	New York, N. Y.
Karau, Jane Ruth	Columbus High School	Marshfield, Wis.
Londak, Bernadette Genevieve	Mercy High School	Chicago, Ill.
Marshall, Ruth Ann	Corvallis Senior High School	Corvallis, Oreg.
Waldman, Lise Jo	Upper Darby Senior High School	Upper Darby, Pa.
Wallace, Lynda Diane	Saint Mary High School	Cheyenne, Wyo.
Burger, Richard Melton	Jamaica High School	Jamaica, N. Y.
Burns, Stephen Kent	Romeo High School	Romeo, Mich.
Cantrell, Cyrus Duncan III	Ithaca High School	Ithaca, N. Y.
Devine, Paul Joseph Jr.	Gonzaga High School	Washington, D. C.
Dyroff, David Ray	Dupo Community High School	Dupo, Ill.
Gaidis, James Michael	Baltimore City College	Baltimore, Md.
Gentle, Kenneth William	Lyons Township High School	La Grange, Ill.
Halperin, Bertrand Israel	George W. Wingate High School	Brooklyn, N. Y.
Jensen, Richard Joseph	Salpointe High School	Tucson, Ariz.
Kapuler, Alan Mitchell	Erasmus Hall High School	Brooklyn, N. Y.
Kirk, Rodney Carlos	Albany High School	Albany, Calif.
Kripke, Saul Aaron	Central High School	Omaha, Nebr.
Kukla, Andy	Fairfax High School	Los Angeles, Calif.
Kuzmack, Arnold Mark	Bronx High School of Science	New York, N. Y.
Malone, Jesse Jr.	Choteau High School	Choteau, Mont.
Martens, Charles Paul	Charles City High School	Charles City, Iowa
Martz, Eric	University High School	Bloomington, Ind.
Okun, Lawrence Merritt	Kenmore Senior High School	Kenmore, N. Y.
Pestcoe, Allan Emanuel	Miami Beach Senior High School	Miami Beach, Fla.
Rice, Jerry Mercer	Anacostia High School	Washington, D. C.
Rosner, Jonathan Lincoln	Roosevelt High School	Yonkers, N. Y.
Seaton, Robert Kirk	Thomas Jefferson High School	Elizabeth, N. J.
Shepard, Kenneth Wayne	Sidney Lanier High School	Montgomery, Ala.
Smith, Leslie Ewart	Vermilion High School	Vermilion, Ohio
Thomae, Irving Herbert	Attleboro High School	Attleboro, Mass.
Wagreich, Philip Donald	Jamaica High School	Jamaica, N. Y.
Weihofen, William Henry	Phillips Academy	Andover, Mass.
Williams, Robley Cook Jr.	El Cerrito High School	El Cerrito, Calif.

Addresses are locations of the schools from which entries were made.

Science News Letter, March 15, 1958

Left column, beginning at the top of the opposite page, Dr. T. H. Reed, acting director of the National Zoological Park, demonstrates a method of "shooting" medicine into sick animals; Dr. J. C. R. Kelly Jr., Westinghouse research scientist, discusses chemical power and electron thermodynamics; Rep. Joseph W. Martin Jr., with two winners from Massachusetts; Dr. Wallace R. Brode, science adviser to the Secretary of State, explains atomic structure. Center, top row: Cyrus Duncan Cantrell III, representing the 40 winners, makes the winners' "thank you's" at the Awards Banquet.

Right column: Winners at the National Bureau of Standards; Drs. Joseph E. Smadel, associate director, National Institutes of Health, Chien Shiung Wu, Columbia University, and Brode talk informally following an Institute session; Dr. James R. Killian Jr., science adviser to the President, and Donald C. Burnham, vice president of manufacturing for Westinghouse Electric Corporation, are shown with the five top winners. →

● RADIO

Saturday, March 22, 1958, 1:30-1:45 p.m., EST

"Adventures in Science" with Watson Davis, director of Science Service, heard over the CBS Radio Network, will not be broadcast on March 22.

Adventures in Science" will resume at its regular time Saturday, March 29. Check your local CBS station.

SCIENCE NEWS LETTER

VOL. 73 MARCH 15, 1958 NO. 11

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GENERAL SCIENCE

Top STS Winners Named

For the first time in Science Talent Search history, the two top winners come from the same school. Northern, eastern, midwestern and western states have winners this year.

See Front Cover

➤ THE FIVE most promising young scientists in the country are: a 17-year-old future physicist who has built a home-size cyclotron, an aspiring aeronautical engineer-designer of a flying platform, a girl-astronomer who tracked the first Russian satellite, a boy who has spent three years teaching himself organic chemistry, and a physical chemist-to-be who has done significant research work in the laboratory of a Nobelist. They are the five top winners of the 17th Annual Science Talent Search.

These high school seniors from Massachusetts, New Jersey, Illinois and California were named winners of Westinghouse Science Scholarships ranging from $7,500 to $3,000. A sixth student, from Alabama, was named as alternate.

The photograph on the cover of this week's SCIENCE NEWS LETTER shows all five top winners and the alternate. They are, top and left to right, Reinier Beeuwkes III; Dushan Mitrovich; Jane Shelby; and, bottom row, Donald Michael Jerina; Neil Logan Nininger; and Kenneth Wayne Shepard.

Reinier Beeuwkes III of Newton High School, Newtonville, Mass., who was awarded the Grand Science Scholarship of $7,500, looks forward to a career in university research and teaching in physics. This tall, athletic boy, who enjoys mountain-climbing, skiing, astronomy and being manager of the varsity football team, hopes to continue his training next fall as a physics and mathematics major at Harvard University.

The compact cyclotron, which helped "Rein" win first place among the 40 outstanding young scientists who are this year's winners in the Search, was built from his original design. It fits into the side of a room and cost less than $150, although, as the young physicist remarks, "a cyclotron is usually thought of as great in size and fantastic in cost." He is eager to improve its operation and to broaden its research possibilities.

A Newton High School classmate of Rein's, Dushan Mitrovich, 18, of Chestnut Hill, Mass., was awarded the $6,000 scholarship as second winner. Dushan came to the United States from Yugoslavia nine years ago with his parents, Mr. and Mrs. Milenko Mitrovich. The experimental flying platform that was the subject of his research report is the climax of a large number of experiments with aircraft models and wind tunnels which he has been carrying out since his junior high school years. Dushan studied the captive flight performance of this model of a shrouded-propeller type of flying platform and worked out both a theory to explain its instability in flight and a system of automatic control. He plans to prepare for a career as an aeronautical engineer at Massachusetts Institute of Technology.

Rein and Dushan have brought unusual distinction to Newton High School where they are members of the same accelerated physics class under Dr. Albert F. Navez. No other high school has had two scholarship winners at once in the 17-year history of the Science Talent Search. Dr. Martin Karplus, the 1947 top scholarship winner, was also from this school.

Third place and a $5,000 scholarship went to 17-year-old Jane Shelby of Teaneck, N. J., who wants "very much to have a part in the epoch-making step into space." Jane has wanted to be an astronomer since she was seven years old and looks forward to future astrophysical research from the moon, exploring the possibilities of astronomical observation without the hindrance of an atmosphere. Her project report concerned calculation of the orbit of sputnik I from amateur observations, which yields information useful in determining the density of the upper atmosphere and the exact shape of the earth.

An "insatiable desire to find out why things happen as they do" inspired 18-year-old Donald Michael Jerina of River Grove, Ill., to devote three years to performing syntheses of more than 60 benzene derivatives to learn the basic concepts of organic chemistry. His winning of fourth place and a $4,000 Westinghouse Scholarship is dramatic evidence of his success in this self-training.

The winner of the fifth honor and the $3,000 scholarship is Neil Logan Nininger, 18, of Larkspur, Calif. A tall boy of many talents and interests, Neil has attracted the attention of Nobelist Glenn T. Seaborg and Dr. Edward Teller, noted physicist.

Two summers ago Dr. Seaborg invited Neil to work at the University of California Radiation Laboratory on a student fellowship. Neil was asked to return last summer and his assigned research project was so successful that he was invited to report on it to the faculty of the laboratory. It was this special research, concerned with finding a way to make high temperature tantalum carbide filaments for instruments that employ ion sources, that helped Neil to become a winner in the Search.

Kenneth Wayne Shepard, 17, of Montgomery, Ala., was named as the alternate and along with the remaining 34 of the 40 winners who attended the five-day Science Talent Institute in Washington, D. C., was given a $250 Westinghouse Science Award.

Presentation of the scholarships and awards at the Awards Banquet climaxed the Institute and this year's Science Talent Search. Dr. James R. Killian Jr., special assistant to President Eisenhower for science and technology, addressed the 40 winners and several hundred guests. The Search is conducted by Science Clubs of America, administered by SCIENCE SERVICE, and financially supported by the Westinghouse Educational Foundation.

Science News Letter, March 15, 1958

GEOPHYSICS

Chart Shows Satellite Distance and Elevation

➤ FOR SATELLITE observers who want to spot the man-made objects but do not have all the desired information, the MOONWATCH headquarters of the Smithsonian Astrophysical Observatory, Cambridge, Mass., has prepared a chart for finding a satellite's distance and elevation.

From the new chart, an observer in Chicago who knows that at a particular time a Russian artificial satellite will pass directly over Pittsburgh at a height of 500 miles can tell how high in the sky the satellite will appear from Chicago, how many miles away it will be at the time, and how bright it will look.

Also prepared by the Smithsonian is a table showing the regions from which a U. S. satellite can be seen. Since the time of first sighting depends on the launching time, the table indicates both morning and evening visibility ranges for launchings at hourly intervals for 24 hours.

Science News Letter, March 15, 1958

EXHIBIT PROJECTS — Some of the projects of the 40 top contestants for the Westinghouse Science Scholarships and Awards are shown on the opposite page.

Left column, beginning at the top: Lynda Wallace holds part of her display concerning the unknown bacterium that liquifies potato agar; Eric Martz' project concerned dentifrices; Leslie Smith demonstrates some of the effects of high voltage, high frequency electricity, using an Oudin coil; James Gaidis shows the transistorized transmitter and receiver he designed.

Center column shows: Jane Shelby with the telescope she used; Kenneth Shepard demonstrates the formation of vortexes in water as it drains from a container; Jane Karau points to a sample of cloth she dyed; Alan Kapuler holds an orchid, part of his project on the effects of colchicine on plant growth.

Right column: William Weihofen displays one demonstration of a geometrical relationship; Lawrence Okun explains his generalized theory on the origin of cancer; Saul Kripke points to symbols in his display on symbolic logic; and David Dyroff holds part of his original electronic vector computer, designed to show what vectors are and how they are used in solving practical problems.

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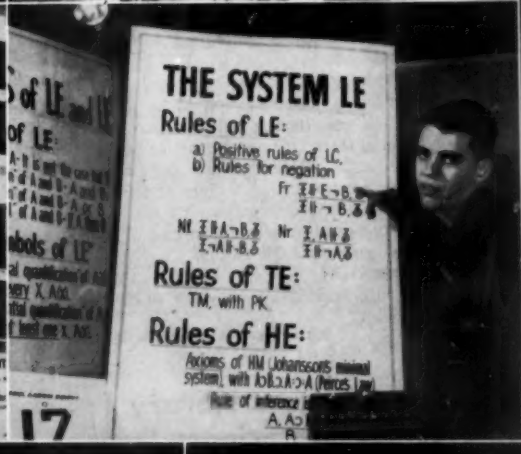
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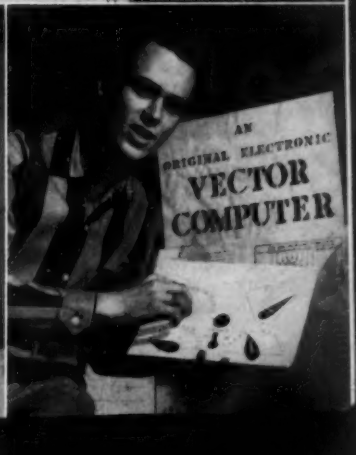

AN
ORIGINAL ELECTRONIC
VECTOR
COMPUTER

NATURAL RESOURCES

New Technique Promises Fresh Water From Sea

➤ LARGE-SCALE production of fresh water from the ocean may become feasible as a result of a radical technique proposed by Dr. Louis A. Bromley, University of California chemical engineer.

The technique, which is still on paper, might come within striking distance of yielding water at a price of 30 cents per 1,000 gallons, the "ideal" generally sought by experts in the field. At the present time, the cheapest mass distillation is done at Aruba, in the Caribbean, for about $1.75 per 1,000 gallons.

Dr. Bromley's "multiple effect centrifugal evaporator" would consist of a tier of whirling trays. Salt water would be distributed along the trays mounted on a rotor. Steam, introduced in a segment below the trays, would whirl them and at the same time vaporize the sea water.

The water vapor would condense as fresh water on the tray next above, flowing off into a trap. The salt left on each tray would also be removed.

The proposed method combines two techniques already proposed or under development: a rotary method and the use of multiple stationary trays. Rotation spreads more thinly both the sea water on top of each tray and the condensing fresh water on the underside, and this permits the use of more trays for a given quantity of heat.

Dr. Bromley says both the compact equipment and the lowered fuel consumption would be expected to reduce costs over present methods.

A single unit, as now conceived, would be 10 feet in diameter and about 12 feet high, each unit having half a dozen stacks of 20 to 50 trays. It would produce between 100,000 and 200,000 gallons per day of demineralized water. A battery of the units producing 10,000,000 gallons of water per day would produce water at a cost of from 25 to 50 cents per 1,000 gallons, Dr. Bromley estimates.

It would take about six years to develop the method.

Science News Letter, March 15, 1958

GENERAL SCIENCE

Britain Starts Library Of Russian Science Facts

➤ A SPECIAL UNIT of the British Department of Scientific and Industrial Research has begun a national lending service of Russian scientific literature.

It is already dealing with approximately 100 requests a week from research and industrial organizations. The scheme is part of the plan to improve the present inadequate methods of disseminating the results of scientific research.

Long-term proposals include building a National Lending Library of Science and Technology in the north of England and building a National Reference Library of Science and Invention.

It is estimated there are at least 1,000 Russian current scientific and technical periodicals. Excluding school textbooks, the Russians are producing about 18,000 titles a year in science and technology. This almost equals British output of titles of all types.

As a first step the new lending library unit of the Department of Scientific and Industrial Research is regularly collecting about 250 periodicals from Russia. It is claimed that it already possesses the largest collection of current Russian material in West Europe.

One difficulty is that much of the Russian literature is not sold and can be obtained only on exchange. Dr. D. J. Urquhart, who is in charge of the unit, is ready to exchange with Russian organizations or to take over exchange offers which British organizations do not want to develop with Russia.

The Government's advisers are also considering measures to improve the arrangements for abstracting and translating Russian technical literature. Only about two percent of Britain's working scientists can read Russian.

Russian language courses may be increased. Proposals are also likely to be made to develop a scheme of cooperative collection and translation by Western European countries of Russian publications.

Science News Letter, March 15, 1958

GEOPHYSICS

Atmosphere Found Denser Than Thought

➤ THE EARTH'S atmosphere at 240 miles is 40 times more dense than was previously estimated, calculations based on changes in the orbit of the first Russian sputnik have shown.

Even at this density the atmosphere there is still closer to a vacuum than obtainable in any earth laboratory. The matter present, however, is sufficient to reduce by a factor of 40 the previously expected lifetime of any satellite making its closest approach to earth at 240 miles.

This would mean a lifetime of 38 days, not four years, for the proposed Navy-launched Vanguard satellite, which will weigh about 21 pounds with a diameter of about 20 inches, if it circled the earth at distances from 240 to 600 miles into the atmosphere.

Analysis of radio tracking data from the officially named Satellite 1957 alpha two gave the new figures for atmospheric density. Drs. R. Jastrow and I. Harris of the U. S. Naval Research Laboratory, Washington, report their calculations in *Science* (Feb. 28).

Density determinations at such high altitudes are found from the rate by which the satellite's time for one complete trip around the earth changes, other orbital constants and the "ballistic drag parameter," which depends on the mass and area.

There is believed to be about a ten-thousandths of a billionth of a gram of matter in each cubic centimeter of space at 240 miles.

Science News Letter, March 15, 1958

IN SCIENCE

HORTICULTURE

Four All-America Mums Named for First Time

➤ NOW CHRYSANTHEMUM lovers can have the best of these showy, colorful fall flowers. Four mums have been named the first All-America Mum Selections winners and plants will be available this spring.

Ranging in color from deep red through rose and yellow through bronze, these mums represent the finest, widely adapted and "most meritorious" varieties from among three years of entries. Ruby King takes the prize among the red cushion mums; Burning Bronze, bearing two-and-one-half inch double blooms, is a second winner, while rose-petalled Showpiece and golden Emperor share the honors among the large flowered decoratives.

All-America Mum Selections, a non-profit educational institution, conducts trials for testing and screening new varieties of mums. It does no breeding or plant selling. Like its associated organization All-America Selections, it provides a way for evaluating and testing promising new plants.

There are two All-America Selections winners among flowers this year: Maytime, a large flowered ruffled grandiflora bedding petunia in a new color, salmon pink, and a new Petite type of double French marigolds. Four colors, lemon yellow, gold, orange, and a bicolor of maroon red and gold, are represented in this new class of very dwarf, very early marigolds.

Winners among the vegetables are a colorful red lettuce, a white-seeded greenpod snapbean, an exceptionally heavy bearing wax snapbean, a new variety of long-standing mustard greens, and a beet with "globular roots of richest blood-red interior."

Science News Letter, March 15, 1958

AGRICULTURE

Improved Weed Killer Controls Johnson Grass

➤ JOHNSON GRASS, a serious weed pest in 38 states, can be effectively controlled through the use of sodium dalapon, scientists reported to the Weed Society of America meeting in Memphis, Tenn.

The results of four years' cooperation between U. S. Department of Agriculture and state scientists indicate that the herbicide can largely replace costly methods of control such as taking land out of crop production, Ellis W. Hauser, USDA weed specialist, and Jack T. Thompson, Georgia Agricultural Experiment Station, said.

Although it is considered a weed in cultivated fields, and it grows wherever cotton is produced, Johnson grass is an important forage resource and is used for hay and pasture in some areas.

Science News Letter, March 15, 1958

NCE FIELDS

PHARMACOLOGY

Drug Combination May Reduce Electroshock Aid

➤ A NEW DRUG combination has shown promise in the treatment of depression and has replaced the electroshock treatment in some cases.

Dr. Leo Alexander of the Boston State Hospital reports in the *Journal of the American Medical Association* (March 1) that the drug combination, meprobamate (Miltown) and benactyzine hydrochloride (Deprol), made the use of electroshock unnecessary in more than one-half of the 35 patients to whom the combination was given.

The recovery rate was described as "highly promising." It was "definitely" above the spontaneous recovery rate expected during the first year of illness, and only slightly below that obtained with electroshock.

To be effective against depression, a drug must reduce excitability without too much depressive action, and at the same time strengthen a person's "ego boundaries" by reducing psychic pain, fear, and resultant avoidance responses engendered by stress.

While no single drug fulfills both requirements, meprobamate fulfills the first and benactyzine hydrochloride the second.

Science News Letter, March 15, 1958

MEDICINE

Soot-Lung Cancer Relationship Discovered

➤ HOW a carcinogenic or cancer-causing substance in soot, 3,4-benzpyrene, can cause lung cancer has been found.

Plasma protein, found in abundance in the lungs, is able to dissolve the 3,4-benzpyrene out of the soot and "free it to be acted upon by tissue to form cancer," says Dr. Hans L. Falk, pathologist at the University of Southern California School of Medicine.

Dr. Falk and his associates have drawn this picture of their soot-lung cancer relationship:

The inhaled soot particles are broken down into their component parts. The 3,4-benzpyrene is dissolved out of the particles by plasma protein. In this free state it is susceptible to action by tissue resulting in cancerous growth.

Previously, it was not known how the body could grasp this cancer-causing agent that is locked in the soot particles floating over most U. S. cities.

Dr. Falk worked with Adele Miller, also at the University, and Dr. Paul Kotin of Los Angeles County General Hospital. The biological activity of the soot, after it enters the respiratory tract, is definitely favorable to lung cancer, they report in *Science* (Feb. 28).

Renewed interest in the cancer-causing properties of soot, they said, followed the observation that the risk of development of lung cancer is greater among urban residents than rural.

Previously, 3,4-benzpyrene had been found in ashes of cigarette paper. It has also been shown that 3,4-benzpyrene can cause cancer, depending upon the amount inhaled. Dr. Falk and his colleagues tackled and solved the problem of how and what the body used to dissolve the soot once it had entered the lungs.

Science News Letter, March 15, 1958

EDUCATION

College Faculty Member Salary Averages $6,120

➤ THE SALARY paid college faculty members will average $6,120 this year.

This "shamefully low figure" is reported by the Office of Education, Department of Health, Education and Welfare. A new study on higher education shows that average faculty salaries in public colleges and universities range from $5,110 for instructors to $8,530 for full professors.

In private institutions, the average salary is $4,230 for instructor and $7,360 for full professors.

Concerning the report, HEW Secretary Marion B. Folsom said that college teachers train most of the future leaders in all walks of life.

"They must receive greater rewards if we are to attract and hold those with the best qualifications for teaching the young men and women of this country," he said.

Nearly 1,150 colleges and universities, having more than 80% of all higher education enrollment, participated in the study, which was designed to provide basic information to assist college administrators.

A 102-page report of the study, "Higher Education Planning and Management Data, 1957-58," was prepared by W. Robert Bokelman of the Office of Education.

Science News Letter, March 15, 1958

EDUCATION

One-Fourth of Freshmen Drop Out of College

➤ KEEPING students in college seems to be as much of a problem as getting them to go to college.

A U. S. Office of Education study shows that about one out of four students who enter college drops out before the end of the freshman year. This is as many as the students who quit in the following three years combined.

Particularly alarming is the fact that one-fifth of all the students who drop out permanently were in the top 20% of their high-school graduating class.

Out of every ten students who begin college, only six finish.

This is a "distressing waste of talent," Commissioner of Education Lawrence G. Derthick said, pointing out that the number of 18-year-olds in our present population is very low and these are our potential leaders.

The study was prepared by Robert E. Iffert of the Office of Education staff.

Science News Letter, March 15, 1958

ENGINEERING

Direct Telephone Dialing To Europe Expected

➤ IT MAY be possible to place a telephone call to Europe just by dialing the number directly on your own phone in the next five to ten years.

The nation-wide dial toll system is being made flexible enough for ultimate interconnection with European systems through the transatlantic submarine cable, O. F. Wallman, American Telephone and Telegraph Company, New York, reported to the American Institute of Electrical Engineers meeting in New York. It will also be possible to serve Hawaii through the transpacific cable, and telephones in Canada as well.

About half of the 300 automatic machine switching centers planned to serve 62,000,000 U. S. phones have been installed. The remainder will be in operation within the next five to ten years, Mr. Wallman said. He implied that the exact time when direct dialing to European numbers will be possible depends on switching progress there.

Science News Letter, March 15, 1958

ENGINEERING

Develop Accurate "Space Speedometer"

➤ AN ULTRA-SENSITIVE "space speedometer" for measuring accelerations in any direction in space has been developed by the Sperry Gyroscope Company, Lake Success, N. Y.

When used with gyroscopes to feed signals to a miniature computer, the device gives a very accurate, jam-proof guidance system for aircraft, missiles and atomic submarines.

Dr. W. L. Barrow, research vice-president of Sperry, said the sensitive accelerometer can detect the slight gravity force produced by an angular deflection as small as a ten-thousandth of a single one-minute space on a wrist watch. The device is now being produced for the Navy and Air Force.

Three small, self-contained metal cylinders form the accelerometer. Smallest is the floating sensor, the acceleration-sensitive element. This is immersed in a silicone fluid inside the next larger cylinder, which in turn is supported by bearings within the outer shell.

The smallest cylinder, within the silicone fluid, would rise to the surface except that the middle cylinder is made to spin by a small motor that rotates the fluid, causing the inner sensor to center itself exactly.

Because the sensor is supported only by the spinning liquid, static friction is eliminated and the slightest acceleration along its longitudinal axis moves the sensor along this axis. The tiny distance moved can be measured precisely by electronic methods.

Thermostatic controls in the outer shell hold the temperature within the unit to within one degree Fahrenheit even when the surrounding temperature swings as much as 80 degrees.

Science News Letter, March 15, 1958

GENERAL SCIENCE

The Qualities of a Scientist

The young scientist of today needs to develop qualities of compassion, tenderness and high-mindedness in addition to technical and academic abilities in his chosen field.

By DR. JAMES R. KILLIAN JR.

Special Assistant to the President for Science and Technology

An address given at the awards banquet of the Seventeenth Annual Science Talent Search, in Washington, D. C., March 3.

➤ I HOLD TWO convictions which make me happy to appear here tonight and to congratulate this year's 40 winners of the Science Talent Search Awards.

The gathering obligations and challenges of our time place a mounting premium on excellence, on high performance, on better taste in all of our work and living in the United States. This is my first conviction.

My second conviction is that the quality of American life and the enhancement of this quality depend upon the quality of our leaders, our thinkers, and our innovators. Hence, we must give high priority to motivating and educating an adequate supply of leaders, thinkers and creators, for in doing so we are seeking the principal levers to lift the level of total performance, total opportunity and total welfare of our people.

Using Our Human Resources

The identification, encouragement and education of high talent, then, is of first priority in any program to better the utilization of our human resources. More than any other kind of society, democracy requires talent and leadership.

Started as it was 17 years ago, the Science Talent Search has been a pioneering and sustained effort to contribute to these national needs. It has consistently demonstrated that it is possible to seek out—and identify—those young men and women who are likely to become creative scientists of the future, and the Westinghouse Educational Foundation, Science Service and the Science Clubs of America have served the nation well through this program. I am told that of the 640 winners of these awards over the years, more than half have gone on to receive doctoral degrees—and many have distinguished themselves in academic research, in teaching, or in industrial research.

So it is that those of you who are here tonight to receive the awards your past performance has merited, deserve not only hearty congratulations but also the charge and reminder that your selection places you under special responsibility to develop your talents to the fullest and to act with poise and responsibility.

I have had the privilege of long being associated with education, especially science education, and with talented young people. I know the deep satisfaction of watching them learn and grow and achieve maturity. In speaking to you who have such exceptional talents and such unusual opportunities for future development, I would like to draw on this experience of mine and consequent faith in young people and say some very personal things about the responsibilities, and the art of living, which are important for those seeking professional careers in the field of science and engineering.

On the road ahead some of you will be successful in teaching, or research, or design; others, ultimately, in the responsible direction of great enterprises. Some of you, when you finish your education, may grow to influence the life of our times by your qualities of leadership, or by your discoveries and creative efforts, or by some powerful exemplification of moral strength or purpose. Others of you will win their success and make their contributions not on the superhighways of life, but on the quiet back roads where character, ability and dignity yield rich careers, unacclaimed but marked by grace and dignity. Statistical probability predicts that a few of you will encounter roadblocks or highway accidents and you may not achieve marked success in the conventional sense.

PRESIDENTIAL ADVISER — Dr. James R. Killian Jr., special assistant to the President for Science and Technology.

Whatever may befall you on your journey from now on, success in the deepest and truest sense will be found in the dignity and poise which you reveal in meeting both the failures and the successes of life. It will be found in your perception and acceptance of high standards and ideal aims. Your success will reside especially in your relations to people, in your capacity to be compassionate as well as bright, tender as well as high-minded in your loyalties and and your allegiances. It was once said of the people of Athens that they had the gift of making "gentle the life of mankind." In my benison tonight I include the hopeful anticipation that you will mix with your professional work some of this ingredient for making gentle the life of our turbulent times, for cultivating civility in a period of harsh and brutal incivilities. Scientists and engineers, if they are to be of maximum effectiveness, must possess the true professional spirit of ministering to the public.

"An Indefinable Quality"

Some time ago I read the very moving autobiography of Tenzing of Mount Everest, one of the two first to climb that mountain. He is an unlettered, burly man but still, as Ullman, his collaborator, says, a man possessed of "taste and dignity, courtesy and grace." "There is a flame in Tenzing," says Ullman, "a marvelously strong and pure flame that no storm of man or nature can extinguish. It is compounded of dream and desire, will and struggle, pride and humility; and in the end . . . it is the man's humility that stands out above all his other qualities. In his moment of triumph what he felt in his heart was gratitude to Everest. His prayer for his future life is that it may be worthy of Everest."

It is my hope that you can undergird your competence and specialization with this indefinable quality that shows itself in grace and strength and dignity and humility—qualities that can be achieved independently of education. I hope too that you may always have, so to speak, a sense of being worthy of Everest.

To these unabashed and personal good wishes I add two more arising out of your special interest and your plans to become scientists and engineers. The first is that you may come to serve as expositors and exemplars of the true spirit of science. In the face of the practical responsibilities which rest on science today for our military strength and for our material welfare, it is too easy for people to become convinced that science is limited to these important objectives, and for them to forget that science is also in its own right a field of excitement and adventure and one that provides its own special vision for man to interpret nature. It is one of our most powerful and noble means for searching out the truth and for augmenting man's dignity by augmenting his understanding.

When you become scientists you will have a special obligation to make this true character of science better understood, and to do so not by the arrogant advocacy of science and technology as the only means to increase our understanding and well-being, but by the balanced and tolerant explanation and exemplification of the scientific spirit as one of the great and powerful methods by which man can increase his knowledge and understanding and still stand humble before the wonder and majesty of what he does not understand. When thus understood and carried forward, science is a major means for present-day Athenians to make gentle the life of mankind. This benign nature of science has been eloquently personified by many of our great scientists. The late Albert Einstein possessed not only a transcendently brilliant intellect, but he also marshalled his powers and formed his personality to become a rare human being in his gentleness and his saintliness.

The concluding wish of my benison tonight is that you will couple with a resourceful career of achievement a moderating sense of the simple satisfaction of running the race. The late Gelett Burgess put into verse what I mean:

"Not the quarry, but the chase
Not the laurel, but the race
Not the hazard, but the play
Make me, Lord, enjoy alway!"

In a day when mottoes are out of date and sentiments are inhibited, this verse seems good for those who, like yourselves, stand at the threshold of their professional careers.

With these sentiments of felicitation and admiration, I wish you continuing success and accomplishment.

Science News Letter, March 15, 1958

GEOPHYSICS

Explorer III Scheduled For Early Launching

➤ EXPLORER III, the third U. S. satellite, is scheduled for an early launching, Undersecretary of the Army Charles C. Finucane reported.

Work on the new satellite has been started at the Jet Propulsion Laboratory of California Institute of Technology where the two earlier satellites were made. It was also learned that Explorer III would be the first of a series of five new "moons" the Army plans to try to put into an orbit around the earth. Explorer III will carry out International Geophysical Year experiments, using two or more magnetic tape recorders to perform several experiments simultaneously.

The launching attempt will probably be made some time in early April, although no definite date was given except for "at least 10 days and probably more than a month" after the announcement on March 6.

The Army estimates that Explorer II, launched Wednesday afternoon, March 5, re-entered the earth's atmosphere and burned about 1,900 miles from Cape Canaveral at a point over the Atlantic Ocean north of the Guianas in South America. It was last heard from 20 minutes after it was launched, 530 miles beyond Antigua Island.

Science News Letter, March 15, 1958

TECHNOLOGY

New TV Tube Shown To STS Winners

➤ A NEW CATHODE-RAY tube that promises to give sharper television pictures, even in daylight, was demonstrated before the 40 winners of the Westinghouse Science Talent Search.

Dr. James H. Schulman and Robert J. Ginther of the Naval Research Laboratory, two of the scientists associated with the new development, explained that instead of using a phosphor coating on the inside face of the TV picture tube, an especially prepared glass screen is used. Because it is transparent, there are a number of reasons why the new tube would result in an improved image.

Light from the outside passes into the new transparent tube and becomes absorbed instead of being reflected back into the viewer's vision as happened with the phosphor coating of the ordinary tube.

No halo-of-light effect is produced since there are no phosphor particles. The phosphorescent light that originates in each grain of the coating had previously scattered into surrounding grains before the light emerged from the tube.

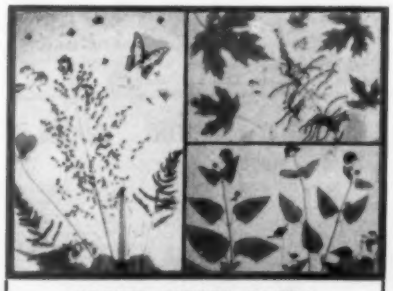
In contrast to the conventional tube, there are no grains to limit the sharpness of the image that can be produced on the transparent screen.

"Activating impurities" introduced into the pores of a high silica glass, 96% silicon dioxide, is what gives the new NRL tube its luminescence.

Glass screens that produce five different colors, deep blue, greenish-blue, green, yellow and orange-red, were shown to the visiting students. Cerium-activated glass gives the deep blue color, while the others are caused by copper, uranium, manganese and samarium.

Science News Letter, March 15, 1958

A synthetic compound, norethandrolone, causes *weight gain* in elderly persons and in other "essentially healthy individuals" who have remained thin despite taking vitamins and tonics and eating special diets.



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• Books of the Week •

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

ANIMALS AND MEN IN ARMOR—Genevieve Vaughan-Jackson—*Hastings House*, 88 p., beautifully illus., with drawings by author. $3.75. Geology for young people.

APPLICATION OF TENSOR ANALYSIS—A. J. McConnell—*Dover*, 318 p., paper, $1.85. Student reprint of a standard work particularly rich in practice examples.

ARCTIC WORLD—John Euller—*Abelard-Schuman*, 142 p., illus., $3. Written by an enthusiast about life and exploration in the far north.

ASTRONOMY HANDBOOK—Leon A. Hausman—*Arco*, 143 p., illus., $2. For beginning star gazers.

BEHAVIORISM—John B. Watson—*Univ. of Chicago Press*, 308 p., illus., paper, $1.50. New edition of the famous work that had such a tremendous impact on psychology.

CAREERS IN GEOLOGY: Areas of Specialization, Training, Scholarships, Fellowships, Opportunities, Where Employment Is Found—Juvenal L. Angel, *World Trade*, 26 p., $1. Information needed by young people when they are choosing their life work.

CHEMICAL REACTION ENGINEERING: 12th Meeting of the European Federation of Chemical Engineering, Amsterdam, 7th, 8th, and 9th May, 1957—K. Rietema, Ed.—*Pergamon*, 200 p., graphs, $12.50.

CHILD CARE AND TRAINING—Marion L. Faegre, John E. Anderson and Dale B. Harris—*Univ. of Minnesota Press*, 300 p., 8th ed. rev., $3. For parents, telling of normal development and how to aid it.

THE DETROIT SCIENCE EDUCATION STORY—Samuel M. Brownell—*Thomas Alva Edison Foundation*, 20 p., paper, single copies free upon request direct to publisher, 8 West 40th St., New York 18, N. Y. Having as teachers of mathematics or science those who dislike these subjects is cited as one hindrance.

THE EARTH AND ITS ATMOSPHERE — D. R. Bates, Ed.—*Basic Books*, 324 p., illus., $6. Providing a background for understanding the research of the IGY.

EARTH FOR THE LAYMAN—Mark W. Pangborn, Jr.—*Am. Geological Inst.*, Report 2, 2d ed., 68 p., paper, $1. Listing nearly 1,400 books and pamphlets of popular interest on geology, mining, oil, maps and related subjects, and intended to direct young people toward science as a career.

EFFECT OF RADIATION ON HUMAN HEREDITY: Report of a Study Group Convened by WHO Together With Papers Presented by Various Members of the Group—H. J. Muller and others—*World Health Organization*, 168 p., diagrams, $4. Reporting the opinions of experts from countries other than the U. S. and Great Britain.

ENERGY AND MAN—Sir Harold Hartley and others—*Esso Petroleum Co. Ltd. (Standard Oil of New Jersey)* 49 p., illus., paper, single copies free upon request direct to publisher, 30 Rockefeller Plaza, New York 20, N. Y. Tracing the history of energy from its origin in the first primeval mass.

ENGINEERING COLLEGE RESEARCH REVIEW—*Engineering College Research Council*, 408 p., paper, $2. Listing research programs of engineering colleges and also names of research administrative personnel and number of workers assigned to each project.

ENGINEERS' COUNCIL FOR PROFESSIONAL DEVELOPMENT 25TH ANNUAL REPORT 1956-1957—M. D. Hooven and others—*Engineers' Council for Professional Development*, 75 p., paper, $1.

EVERGREEN ORCHARDS — William Henry Chandler—*Lea*, 2d ed., 535 p., illus. $8.50. Describing characteristics and problems of many tropical and subtropical trees from citrus fruits to coconut and pineapple.

THE EXPANDING UNIVERSE—Sir Arthur Eddington—*Univ. of Michigan Press*, 128 p., illus., paper, $1.45. An expanded version of a public lecture delivered at the International Astronomical Union at Cambridge, Mass., in Sept., 1932. Student edition.

FORTUNATE STRANGERS—Cornelius Beukenkamp, Jr.—*Rinehart*, 269 p., $3.50. A Dutch-born, American-trained psychiatrist describes for laymen what happens in group psychotherapy.

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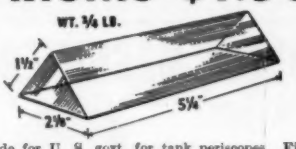

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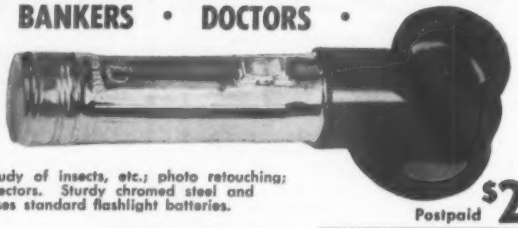

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NON - INFLAMMABLE ADHESIVE can be used to bond leather, wood, fabric, paper, felt and other porous materials to metal. Permanently flexible, the adhesive can be applied by spray, brush or with a roller coating machine.

Science News Letter, March 15, 1958

LEAK-PROOF ALKALINE CELL is described as providing up to ten times longer service than a standard flashlight cell. The cell will supply high currents in continuous service and perform in temperature ranges of from minus 40 to 200 degrees Fahrenheit. It is available in two sizes, the "D" weighing 3.8 ounces and the one-half length "D" weighing 1.6 ounces.

Science News Letter, March 15, 1958

CANVAS BEACH THROW is six feet nine inches long and 31 inches wide. It can be rolled into a small cylinder shape and tied with a tape attached to throw fringes at each end. A matching canvas bag is also available. They come in candy stripe or solid colors.

Science News Letter, March 15, 1958

FOLDING TABLE-AND-SEATS can be used indoors and outdoors. The single-piece combination, shown in the photograph, stands on four legs. It folds into a self-

contained carrying case weighing 32½ pounds and can be stored in a space four inches wide. Top and pull-out seats are made of tempered masonite.

Science News Letter, March 15, 1958

POWER SUPPLY is designed to convert a workbench to an electrical bench. The portable unit plugs into any standard 115 volt AC outlet. The four-station AC-DC power supply has six outlets for soldering irons, motors, etc. Replaceable panel fuses protect against overload. The unit measures 26 by 10 inches and weighs 51 pounds.

Science News Letter, March 15, 1958

MINNOW PAIL is a two-piece-floating and silent fisherman's aid. The outer bucket is made of polyethylene plastic and is non-sinkable. The inner bucket is also made of the plastic and has a built-in floating chamber. An upright fin at the bottom of the inner bucket helps retrieve minnows.

Science News Letter, March 15, 1958

SCREWDRIVER SET contains a reversible screwdriver, cuff links and tie clasp. The screwdriver blade has a 3/16ths inch regular bit at one end and a No. 1 Phillips bit at the other end. The links and tie clasp have matching miniature screwdrivers set in a black oval.

Science News Letter, March 15, 1958

MARINE COMPASS is liquid damped for greater stability. The compass card is designed to tilt 35 degrees in any direction and is graduated in five degrees and numbered every 30. For nighttime use, it is wired for internal illumination.

Science News Letter, March 15, 1958

Nature Ramblings

By HORACE LOFTIN

➤ PERHAPS a graceful gazelle or antelope furnished the inspiration for the first ballet or toe dance by humans. Certainly these creatures, along with the goats, sheep, deer, and other hoofed animals, are past masters at ballet, for they spend their lives on their tip-toes. They walk, run, prance and climb on the very tips of their digits.

Actually, it would be more precise to say they do these things on their toenails instead of their toes, since the hoof is a modified nail.

In general, the hoofed animals can be placed in one of two orders on the basis of whether they have an even or odd number of toes. In America north of Panama, there is only one native representative of the odd-toed mammals, the tapir. The even-toed mammals, or Artiodactyla,

Even-Toed Mammals

are well-represented, however, by the peccaries, deer, pronghorns, bison, sheep and goats.

Exceptions prove the rule, it is said. The exception to be noted here is the peccary. This pig-like animal of the American Southwest has four toes on his forefeet while his hind feet have three digits each. However, our North American artiodactyls are typically even-toed.

The even-toed condition is obtained by the suppression or underdevelopment of the first or inner digit, leaving four functional digits; or, more often, by the suppression of all the toes except the third and fourth.

The habit of walking on the toes (digitigrade), as opposed to walking on the sole of the foot (plantigrade), is generally associated with fleetness. And, with few exceptions, most of the hoofed animals depend on speed as their chief defense from enemies. They are almost entirely plant eaters.

Except for the peccary, all the North American artiodactyls have antlers or horns in one or both sexes. The bison, sheep and goats have true, permanent horns. Both male and female pronghorns have and lose horns each year. The deer family has antlers.

Science News Letter, March 15, 1958